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Office Memorandum • UNITED STATES GOVERNMENT

TO : The Files - Contract RD-161, Task Order 3

DATE: 22 December 1960

FROM :

[Redacted]

12 033 026580 010956  
5 22 52 02  
2010

SUBJECT: Trip Report - Frequency to Time Transformation Study

1. On 2 December 1960 the undersigned and [Redacted] SPS/EA, visited [Redacted], to monitor progress on the subject task order. Discussions were held with:

[Redacted]

2. The contractor is exploring uses of compressive networks (giving variable time delay with changing frequency) as analysis tools, and as a technique for improving performance of scanning type receivers. Eventually, it is expected that a receiver can be developed in which the frequency information is converted into the time domain, in which operations may be performed on the received signals with time gating generators. After the signals have been "operated" on, they could be reconverted back into the frequency domain. The total effect is that of a self-adjusting spectrum filter.

3. The contractor has fabricated a 60 stage compressive network with a pass band from  $8\frac{1}{2}$  to  $11\frac{1}{2}$  megacycles. Attenuation of this filter is approximately 30 db at  $8\frac{1}{2}$  megacycles and slightly more near the upper end of the pass band. The maximum theoretical pulse compression ( $\frac{PW_{out}}{PW_{in}}$ ) is 48. Use of this filter in front of the IF section of a conventional scanning receiver could therefore theoretically increase the frequency resolution by this factor, or, without degrading the frequency resolution from that of a <sup>normal</sup> super-heterodyne receiver, permit much faster scan rates. To date, maximum obtainable compressive figure has been 30. With this compressive factor it has been found possible to resolve signals 88 kc apart while using IF bandwidth of 2 megacycles. Additional tests are being made to determine the linearity of this compressive network over the entire pass band and to determine the adverse effects which may result from non-linearities in this system.

4. The use of a compressive network as an analysis tool has also been explored by [Redacted]. A 500 section network has been calculated which would theoretically permit 100 cps resolution of a 10 millisecond noise burst with 20 kc bandwidth. Such a tool might be especially useful on some of the SPS/AF projects.

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[Redacted]